

A Successful Acceleration of Residential Air Conditioning Federal Standards Or, How to Install 30,000 13 SEER or Higher Residential AC Units in 9 Months

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ABSTRACT

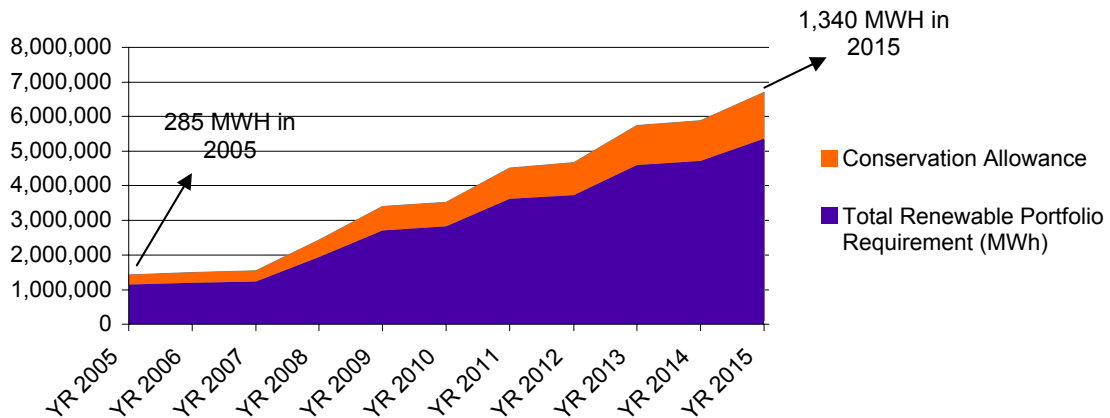
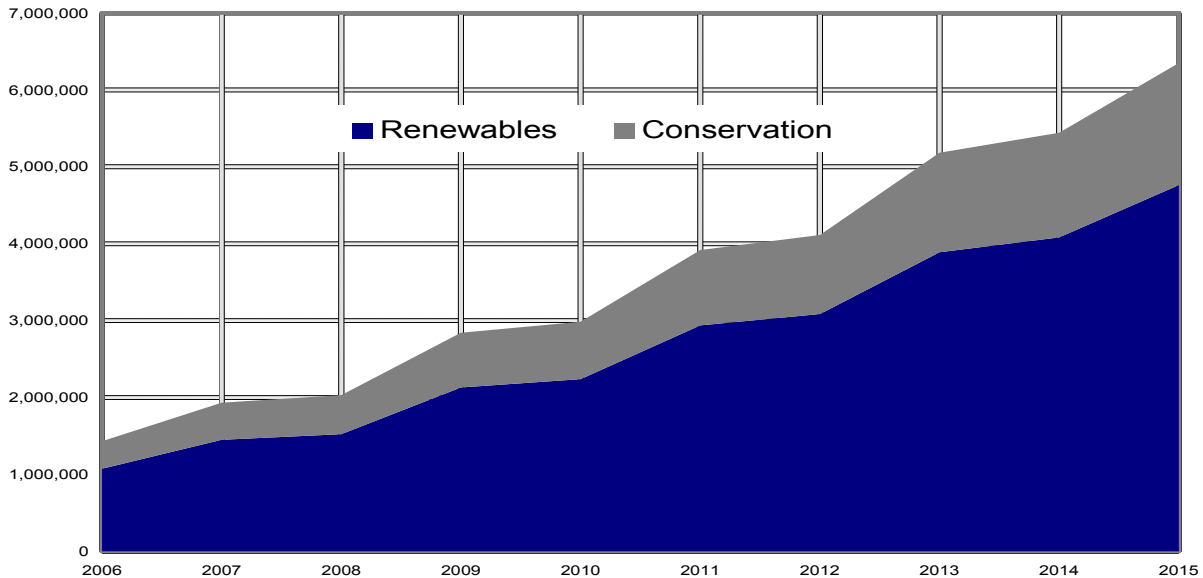
The following presents three distinct perspectives (utility, implementation contractor, and manufacturer) of a unique market transformation program in Nevada. The program ultimately resulted in installation of over 30,000 central air conditioners at the enhanced energy efficient level of 13 SEER (Seasonal Energy Efficiency Ratio) replacing standard 10 SEER equipment and producing peak energy savings of 45,000 Megawatt-hours annually and \$100,000,000 in total utility customer benefits.

Utility Perspective

Since 2002, Nevada Power Company (NPC) has implemented various programs encouraging residential customers to install high efficiency central air conditioning units. Residential air conditioning drives the summer peak demand requirements and contributes as much as 40% of the summer energy requirements—approximately 2000 MW. NPC's high efficiency AC rebate programs have traditionally been directed to the replacement market and often combine an incentive to move to time-of-use (TOU) residential rates. These programs have all been “contractor” delivered, using a third party consultant team and local HVAC contractors to sell, deliver, and implement the utility's program to residential customer. Customers have the option of either accepting the rebate themselves or assigning the rebate to the contractor to reduce the purchase price. Between 2002 and 2005, Nevada Power paid approximately \$4,000,000 in customer rebates and encouraged customers to install 12,000 air conditioning units with SEER ratings of 13 or 14 rather than 10.

Since 2001, Nevada utilities have had a renewable portfolio requirement to meet a percentage of their delivered output with renewable power sources, typically, wind, solar, geothermal and biomass. The requirement began with 5% in 2001, gradually increasing to 15% in 2013. In 2005, the energy environment in Nevada changed with the passage of Assembly Bill 3 (AB3) in the Nevada Legislature. The law allows energy conservation to contribute up to 25% of the renewable portfolio requirements. Nevada Power was immediately placed in a better position to meet the requirements of its renewable portfolio—and to help the state meet its new energy policies. With the passage of AB3, NPC's efforts to introduce energy efficiency programs to reduce customer energy consumption, especially during the summer peak period, have become a key component toward meeting these requirements.

Figure 1. Conservation as Growing Part of Renewable Portfolio Requirement
(estimated MWh, 2006-2015)



Simultaneous with the passage of AB3, EPAct 2005 increased the Federal energy efficiency standards on residential air conditioning units. Air conditioning manufacturers, beginning in January 2006, were required to manufacturer units with a minimum 13 SEER rating. Manufacturers, distributors, and contractors would be allowed to sell 10 SEER units into calendar 2006 only to exhaust the “pipeline” of units manufactured prior to January 2006.

In southern Nevada, approximately 25,000 new homes are built annually. Many of these homes have multiple air conditioning units. Market intelligence suggests that about 40,000 air conditioning units are installed in these new homes each year. Approximately thirty-five builders construct 95% of these homes and install a similar percentage of the new air conditioning units. These builders faced challenges in meeting the new Federal residential air conditioning standards. As one example, the 13 SEER condensing units often have a much larger

footprint than 10 SEER units. Thus the higher efficiency models would require builders to change their design standards and rethink housing lot lines and property development.

An Opportunity for Savings

In anticipation of these changes, in the summer of 2005, NPC working with Cypress, Ltd. as its energy-efficiency consulting partner began to quantify the opportunity in the builder channel and create a plan of action. Market research indicated that without any incentives, southern Nevada builders would continue to install 10 SEER units until the local supply chain was exhausted, which could last until June 2006 at a minimum. The challenge was to identify how quickly builders could transition to the new 13 SEER standards and what incentives were necessary for them to make that transition. These contractor surveys examined three major variables: 1) the builders' anticipated cost of implementing the new 13 SEER standards, 2) the size of the incentive required to change builder behavior, and 3) whether the builders would be open to implementing the program earlier than the mandated 2006 deadline. The results were clear: the incremental cost would be close to \$600, builders were agreeable to splitting the costs with the utility (50/50), and because of the utility - builder community partnership, builders indicated that they were willing to change their behavior in order to install the 13 SEER units earlier than mid 2006.

In reviewing internal data, NPC estimated that a typical residential AC unit conversion from 10 SEER to 13 SEER would result in energy savings of approximately 2,000 kilowatt-hours per year.¹ Calculating an avoided cost of \$50 per MWh, NPC would achieve a utility benefit of \$100 per year, or a simple payback of just over 3 years (\$300 rebate plus program implementation and utility overheads) through the implementation of a program. Total Resource Cost (TRC) test results would later produce a benefit/cost ratio of 1.8 for this program.

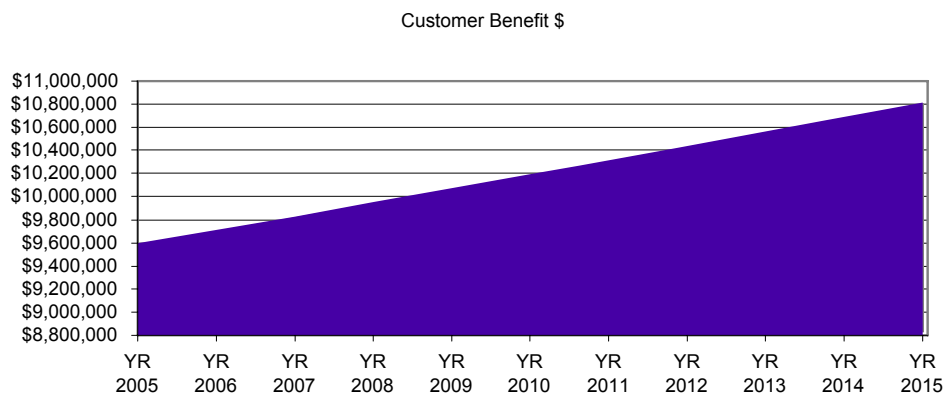
Once developed and introduced, the program took off very quickly. Once an appropriate incentive was agreed to - a \$300 rebate per verified installation directly to the home builder - a significant number of builders committed to participate. By the end of summer 2005, in discussions with thirty-two of the largest homebuilders, twenty-three committed to participating in the program. Based on their estimate of expected housing starts before June 2006, 30,000 air conditioning units that otherwise would have been installed at a 10 SEER level would now be upgraded to 13 SEER.

Encouraging builders to install 13 SEER equipment in advance of the approaching federal minimum efficiency standards for central air conditioners in the market offered a tremendous energy savings opportunity. An estimated 45,000 Megawatt-hours per year of energy would be saved for each of the next eighteen years (the estimated useful life of a central air conditioning unit). Additionally, it would have a utility benefit of avoiding energy and fuel purchases \$2.2 million per year. Estimates indicate NPC customers would see a benefit in reduced power bills of approximately \$200 per unit per year – or just under \$100,000,000 in total utility customer benefits over the next fifteen years. As can be seen in the graph below, customer

¹ While demand is one of the drivers of the program, Nevada only provides credits to the utility for energy savings. There is, however, a multiplier for energy savings on peak.

benefits, which are reduced annual power bills, increases steadily based on an assumption of steadily increasing utility rates.²

Figure 2. Solid Growth in Customer Benefit



Cypress Perspective

Cypress, Ltd. is the energy efficiency implementation contractor for Nevada Power Company. As such, Cypress has developed a highly collaborative approach in working with NPC. NPC and Cypress goals are consistently aligned. Cypress has worked with utility clients for over fifteen years, developing comprehensive customer programs designed to reduce utility costs while providing significant value to utility customers. With a specialty focusing on the utility customer and the energy efficiency value chain, Cypress programs typically provide unique solutions to the needs of consumers.

Work with the utility leadership in 2005 made it clear that NPC was under growing pressure to reduce energy consumption in the Las Vegas valley. It also was clear that this pressure would be in place well into the future.

Large challenges require commensurate response. Cypress, Ltd. has long understood that Las Vegas is one of the fastest growing communities in the country and that residential homebuilders were responsible for a majority of air conditioners installed in the valley. Market estimates showed that the annual market for air conditioners in Las Vegas is about 65,000 units per year, of which 43,000 are installed in new homes (new construction).³ Homebuilders accounted for a very small percentage of NPC AC rebates in previous years. Despite this fact, Cypress worked to develop custom processes to administer incentives in this market channel based upon the interest expressed by a number of “niche” builders. These processes at first included providing “cash at closing” to homeowners and developing customized information exchange with builders to ensure homeowners would receive payment promptly and accurately.

Working with NPC to understand the nature of their more aggressive market transformation goals, creativity was required. NPC now wanted to find innovative ways to impact the majority of the market, which meant reaching all market segments including the

² This program did not link to the TOU rate, but customers could save even more energy if this link is made TOU was not addressed because the program was directed to builders and not end-use customers who would sign-up for a TOU rate.

³ Source. Southern Nevada Homebuilders Association

larger national “Top 20” homebuilders (e.g. the 43,000 of the 65,000 new AC units in the Valley). It is important to realize just how different the purchasing decision is for each of the market channels for high efficiency AC units.

Custom and Retrofit Builders

The smaller, custom homebuilders were also targeted and included in the program as in previous years. They sell homes in small quantities (usually less than 200 homes per year), and generally have the ability to integrate customized technologies or products in their sales cycle. These homebuilders can, in a relatively rapid fashion, integrate changes to both construction processes as well as customer sales materials. This allows them to promote a new offering or technology, such as a high efficiency air conditioner and cash rebate, and capture a pricing premium at the same time. They have both the flexible construction and sales processes to support new technology integration.

The retrofit channel depended on a consistent message to a fragmented contractor community, who in turn delivered this common message to individual buyers capable of making a purchasing decision for a high efficiency unit. The task in promoting rebates was to ensure that every contractor had a shared understanding of the program’s incentives and requirements. To ensure a consistent market message and understanding of that message, standardized rules and processes were developed and all participants adhered to them consistently. Furthermore, leveraging local meetings of contractors to ensure the entire contracting community received the same messages was a well-implemented and effective tool.

Finally, the retrofit channel allowed dependence, ultimately, on the consumer as the responsible party for the rebate with the consumer receiving the rebate as they made the purchasing decision. In the analysis it was determined that customers provide much of the “pull” that ensures the ongoing demand for rebates and for high efficiency installations.

In the smaller builder market, customized processes were developed to provide materials and rebates to the homeowner so the builders could capture an upgrade to a higher efficiency AC unit at the point of sale. Neither of these options was appropriate when dealing with the large homebuilders.

Large Homebuilders

The large homebuilders operate differently from custom and retrofit builders. They have developed highly streamlined construction and sales processes to maximize margins and volume levels. Their production volumes dwarf the smaller builders, as a large homebuilder may construct upwards of 4,000 new homes in a year (they will build more in a month than a smaller builder does in a year). In order to support this volume, they make large-scale aggregated purchases with national manufacturers and have highly coordinated building schedules to maximize production efficiency and profits. Integrating a new technology or equipment change typically takes months or years to complete, as it requires a change in the standard processes at both the production and sales levels. It also requires some form of integration with central purchasing that is often at a corporate office that is invariably out-of-state.

In the case of larger “track” homebuilders, the standardization of building materials and systems generally removes the consumer from the decision. This is true, at a minimum, for the larger-scale infrastructure decisions such as building materials, general floor plans, and major

equipment, including air conditioners. Homeowners have some options in relation to upgrades, but in the southern Nevada “track” builder market, the air conditioning unit seldom is included in such a package. The builders are more interested in promoting lifestyle-related upgrades such as premium countertops, appliances, or flooring than a high efficiency air conditioner that will reduce cost of ownership. Specification of air conditioning equipment tends to be part of a larger quality initiative for the homebuilder, which includes high-end construction materials and craftsmanship.

More importantly, larger homebuilders don’t typically promote a high efficiency air conditioner offer as a sales option. This is true because in order to achieve purchasing efficiency, they standardize equipment selection to achieve better pricing through ordering volumes and then market the decision as a customer benefit. To further complicate program design, these homebuilders work directly with manufacturers to negotiate pricing. In most cases, they place orders based on forecasted home sales three to four months in advance of installation. This close relationship with manufacturers suggested that most of the homebuilders planned on transitioning to the higher efficiency units only when the entire backlog of SEER 10 and 12 units were exhausted. In business terms, they deferred the expense of changing their construction processes as long as possible, which is a typical decision, as most accountants prefer to defer expenses and accelerate income.

Figure 3. Example of Field Verification of AC unit



To reach the large homebuilders, a completely different marketing and promotional approach was needed. The challenge, therefore, was to find a way to convince homebuilders to change their purchasing rules to incorporate high efficiency units well before 10 AND 12 SEER stocks were depleted (likely in mid to late-2006). Their internal standard construction processes, combined with order quantity agreements with manufacturers dictated that a change to SEER 13 or above would need to be made on a “wholesale” basis.

After having discussions with representatives of each national home builder in Las Vegas, these issues were confirmed. It quickly became clear that the need was to influence purchasing behavior well before a home was built and often before a buyer had even “walked into the office.” This required a process to direct the rebates to the builder, as they were the entity making the purchasing decision. It also required the development of a “mass customization” process, accommodating each builder’s custom processes and procedures. Those processes included how rebates are reserved and received, as well as a unique communication process to verify to Cypress the completion of the installation.

The rebate levels were acceptable to the builders, covering approximately half of the incremental expense of the higher efficient models. As previously stated, incentive levels were based on feedback received during market surveys. The builders indicated that a significant portion of the upgrade costs would be required to be covered by NPC in order to transform their standard processes. Also, allowed NPC to exceed its own internal cost hurdles and benefit tests. And as both the Utility and the Builder won, so did the customer with a higher efficient AC unit.

In terms of conveying the benefits of high efficiency technology to consumers, builders utilize their customized marketing material that explains energy saving equipment to consumers, including the long-term financial benefits. They also have the ability to transfer a portion of the premium to the customer as perceived benefits, although generally not all of the incremental difference. Finally, most of the builders expressed a desire to be a part of a “green” effort. Incorporating the high efficiency units as a standard offering provided that green benefit to their consumers and the greater community allowing the builder to include a “cleaner air” message in their marketing resulting in builder enhanced public relations.

The last barrier needed to overcome for the builders was their need to be assured that the rebates would still be available at the time of installation. Traditionally, rebate programs were dictated on a “first come, first served” rule. Starting the year with a fixed amount of rebate dollars, commitments were accepted until these funds were exhausted; then the program was terminated. This created an unacceptable risk for the large homebuilders.

NPC requires proof of installation in order to pay a rebate. The purchasing decision for high efficiency units, however, was made in advance based on standard ordering quantities. If, for example, a builder were to make a large order in April for units to be installed in September based on the consideration of a \$300 rebate per unit, they needed to know that the rebates would still be available the day they install the equipment. Without this assurance, the builders simply were unwilling to change behavior. NPC needed to make a commitment to the builder in advance of the installation to honor the rebate agreement.

The solution was to develop a unique data-base driven reservation system. By collaborating with the development offices for the builders, homes were identified that would be built within the next six months (e.g. when they were making their initial orders with A/C manufacturers). The builders shared this information with Cypress and made a commitment to install high efficiency units in those homes. Then the reserved rebates for these planned homes were placed into a “committed fund”, which in turn determined rebate fund availability. This

then provided an ongoing near-real time ledger of available program dollars while also ensuring that funds would be available for the builders on the day they actually install the A/C units.

The next challenge was timing. By mid-2005, it became clear the manufacturers were in the process of clearing their inventory of SEER 10 and SEER 12 units prior to the Federal Standard change in January 2006. This inventory would be “in the channel” for the coming twelve months or more, and the manufacturers had extended pricing offers for the equipment to the builders as a part of their overall marketing strategy. The program message needed to reach the builders before they placed orders for this equipment, changing the total numbers of lower SEER rated units moving into the Las Vegas market. A significant push was made to reach homebuilders in the summer and fall of 2005 in order to identify future reservations and prepare to “keep the momentum” into 2006.

Working closely with all the major builders, numerous meetings were held with decision makers and leadership. Generally, this required work with both the local Las Vegas based leadership as well as final approval from the builder organization’s central purchasing department, which is generally located out-of-state. Details also needed to be worked out with the construction managers, as the units have a larger “footprint,” requiring changes to installation procedures. Only after being able to identify the value to all three areas of the organizations; central purchasing, construction, and local leadership, did the program move forward to acceptance and implementation. Work continued all summer to obtain the commitments from the builders, and at the conclusion the results proved highly successful.

The end result was that the national builders (KB, Pulte/Del Web, etc.) became interested and began to reserve units, nearly immediately. The combination of customized processes for each builder, a “firm” reservation system to ensure funds would be available, and an acceptable rebate level to cover a significant portion of incremental costs proved to be the right recipe for success.

Figure 4. Results of Market Transformation 2005 -2006

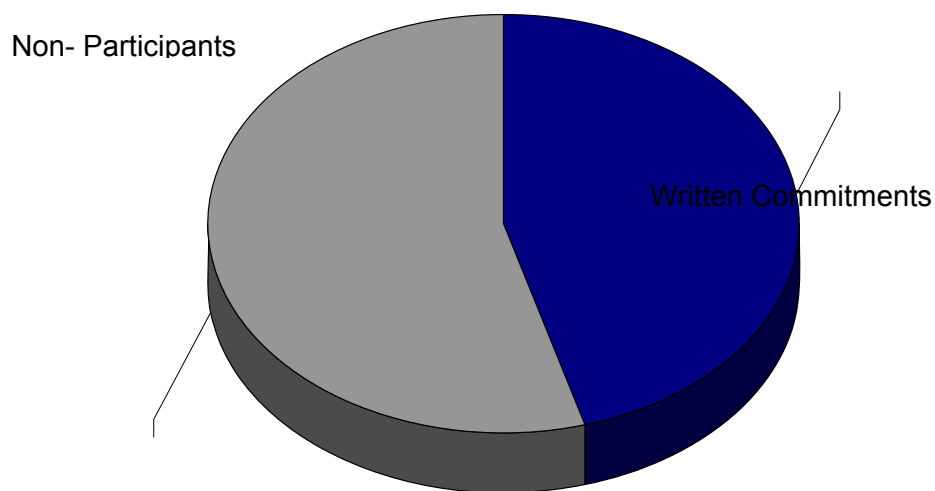
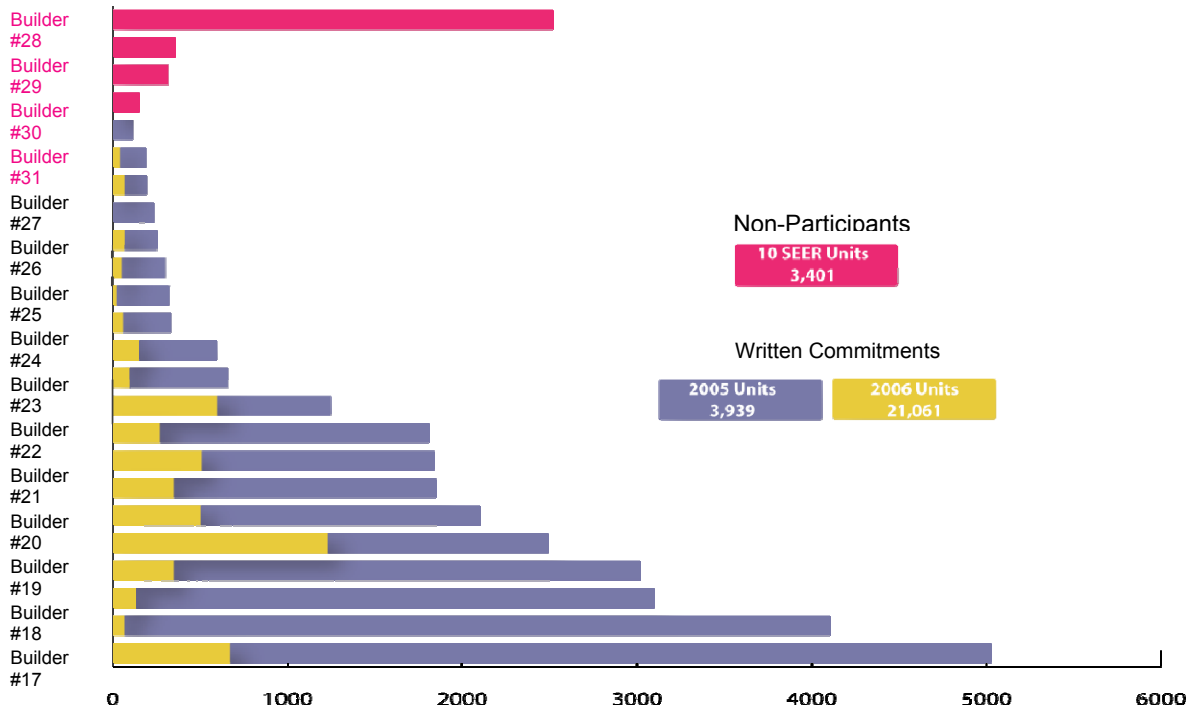


Figure 5. Results of Market Transformation 2005 -2006



The growing reservations truly began to transform the marketplace and NPC and Cypress began to hear from builders who elected not to participate in the NPC program. Their complaint was that, “We can’t find SEER 10 units any more because the manufacturers aren’t even bothering to ship them to Vegas.” This market reality is a testament to the close working relationship developed between the NPC, Cypress, the builders and the manufacturers. Through solid program development based upon understanding the needs of each market player, the market is being transformed.

As a result of this builder initiative, 30,000 new air conditioners will be installed in the Las Vegas market with a SEER rating of 13 or above by mid-year 2006. This market acceleration represents a quantum shift for the Las Vegas community and represents about 57% of the air conditioners sold in the AC channel, annually. The total market for air conditioners in Las Vegas is approximately 65,000 per year, so the overall market penetration for this program is approaching 50% of the overall market in the Valley.

Most importantly, the program has created a very responsive marketing channel for NPC. Las Vegas is a high growth community, and is likely to remain so for the foreseeable future. As the conservation requirements become increasingly aggressive for NPC, there is a confidence that based on NPC creating strong value propositions for the builder community; these homebuilders will continue to present a vehicle to change market behavior. Given links to the leadership of these organizations (both locally and nationally), NPC and Cypress now have the ability to drive new programs and solicit new ideas directly from the builders resulting in continued energy efficiency implementation.

High End Air Conditioner Manufacturer Perspective

Nevada Power needed to have its new builder SEER 13 acceleration program approved for cost recovery by the Public Utilities Commission of Nevada (PUCN). In order to secure that approval it was important that there be no significant opposition from outside interested parties to the PUCN approval. One potential party to that process was a manufacturer of high quality efficient air conditioner with ratings significantly higher than SEER 13. Freus Inc.⁴ manufacturers what has been determined by Nevada Power in independent testing to be one of the highest efficiency residential air conditioning units on the market. Freus builds on a refrigerant-based system that then uses a unique water-cooled condenser coil producing extraordinary efficiencies in excess of 19 SEER. In addition to the overall efficiency of the Freus units, Nevada Power determined in its tests that the Freus units reduce peak load at 110-115 degrees better than any other unit we have ever tested. Freus had been working with Nevada Power for a number of years to incorporate the units into Nevada Power's utility rebate program. NPC recognized the benefit of these units for reducing peak load and had recently (2nd Quarter 2006) provided rebates as high as \$1000 per compressor for retrofit in existing homes. Nevada Power was aware from its work with Freus that it was also interested in the new construction market. Thus, Nevada Power was concerned as to the Freus participation in the PUCN proceeding.

In discussions with representatives of Freus on this issue, NPC determined that Freus was skeptical of NPC's ability to transform the market from 10 SEER to 13 SEER. Freus indicated to NPC that their initial concern was that program dollars were being committed to an effort that may include significant numbers of "free riders". In other words, dollars would be transferred to the SEER 13 program that could otherwise be used for rebates for Freus systems in existing homes. Based on these expressed concerns, NPC and Cypress agreed to enter into more extensive discussions with Freus on this issue. From these discussions NPC determined that Freus became convinced that the majority of program dollars would in fact produce true transformations by builders from 10 SEER units to 13 SEER units. Furthermore, NPC able to convince Freus that by establishing the transformation mechanism and builder relationships, NPC would be in a position to go back to builders for future programs that could include higher efficiency units such as those manufactured by Freus. Thus Freus was transformed from a potential adversary to an ally.

Based on these discussions with Freus, they then chose to actively support NPC in its request for program funds before the Public Utilities Commission of Nevada. The support Freus provided included participation with the Commission staff in discussions that lead to a stipulation of the case. Without the Freus support, no such stipulation would have been possible. Based upon that stipulation, NPC was authorized sufficient funding to institute the program. Even though no Freus units were purchased as a direct result of this initial transformation program, Nevada Power understands that Freus is confident that long term benefits are possible for their firm as the next wave of high efficiency air conditioning transformation programs are instituted by NPC. In an effort to move to this next stage of programs for new builders NPC is actively engaged in discussions with Freus to develop strategies to place Freus high efficiency units in the new construction market.

⁴ www.freus.com

Conclusion

Nevada Power Company, its implementation contractor Cypress, and an understanding of issues facing air conditioning manufacturers, all played a role in developing, implementing and supporting a highly innovative and successful energy efficient air conditioning incentive program. The results indicate the ongoing transformation of the Las Vegas new construction market. 45,000 Megawatt-hours saved per year and \$100,000,000 utility customer savings over a fifteen year period are only the beginning for a program that has the potential to move the market in Las Vegas to one in which AC units represent super high efficiency. To get there, however, even higher incentives will need to be paid to homebuilders who are traditionally cost adverse. To move the market to the super-high efficiency level of a Freus, for example, would require a substantially higher investment by Nevada Power. But gives the ever rising cost of peak power to the utility and a deteriorating load factor such investments could be beneficial. The costs and benefits of such investments need to be investigated.